

# The Canadian Entomologist.

VOL. XXIX.

LONDON, AUGUST, 1897.

No. 8.

## PRELIMINARY STUDIES OF N. AMERICAN GOMPHINÆ.

BY JAMES G. NEEDHAM, CORNELL UNIVERSITY, ITHACA, N. Y.\*

(Continued from page 168.)

*Herpetogomphus pictus*, n. sp. Male.—Ithaca, N. Y.

Length, 49 mm.; abdomen, 35; hind wing, 27.

Green and brown, varied with black and yellow.

Face and frons above entirely yellow; a broad black band between the eyes, including the ocelli; antennæ black, the extreme rim of their cuplike insertions yellow. Occiput yellow, its border convex, ciliated with black. Rear of eyes brown, paler externally.

Prothorax fuscous, with a median twin spot greenish.

Thorax bright green, very thinly clad with brownish hairs, and faintly striped with brown. Dorsal and both lateral stripes subobsolete. Humeral stripe complete, irregular; antehumeral, isolated above, and separated from the humeral by a narrow green line. Subalar and antealar carinæ brown.

Wings hyaline, flavescent at the base. Membranule minute, pale; stigma brown; veins black; costa faintly yellow externally.

Femora straw yellow, lined with black internally and each with a subapical incomplete ring of black. Tibiæ black, each with an external straw yellow line. Tarsi black; hind tarsi with a yellowish mark on the second and third segments superiorly.

Abdomen brown with transverse apical rings of black on segments 2 to 9; additional transverse lines of black on segments 3 to 7, at one-third the length of the segments. A middorsal yellow line, diffuse on segments 3 to 6, sharply bordered with black on 7 to 9. Apex of segment 10 and sides of 8 and 9 (except extreme lateral margin, which is black) and appendages yellow.

Superior appendages scarcely longer than the 10th segment, clad with blackish hairs. Seen from above they are divergent half their length, then parallel to their blunt

---

\*An unfortunate misarrangement of the table for nymphs crept in at the end of the last paper. The two paragraphs immediately preceding the last one on page 168 both relate to *Stylurus*. They should therefore be consolidated and preceded by 7.

Prof. T. D. A. Cockerell has promptly and very kindly called my attention to an oversight in proposing the name *Orcus*, which is pre-occupied. I replace it with *Arigomphus*.

tips. Seen from the side they are thickest at the base and are gradually thinned and slightly declined to their truncate tips, beneath which are three or four rows of minute black denticles, extending more than half way to the base. Inferior appendage bifid for nearly half its length, the branches slightly divergent, truncate a little obliquely on tip, bent up at an angle with the declined basal portion, and bearing on each superolateral margin a broad quadrangular elevation just before the obtuse apex.

The appendages of the 2nd segment are very similar to those of *O. carolus*. (See plate.)

Two ♂s from Ithaca in the Cornell University collection. One ♂ collected by Mr. J. O. Martin, at Ithaca, June 7th, 1897. A handsome species.

The occurrence of a *Herpetogomphus* at Ithaca was quite unexpected. All other species of the genus are from the extreme west and southwest. This one is related to *H. elaps*, Selys, of Mexico.

*Ophiogomphus johannus*, n. sp. Male.—Wilmurt, N. Y.

Length, 43 mm.; abdomen, 30; hind wing, 26.

Black and yellow.

Labrum pale with a narrow brown margin which is broadened laterally. Face yellow; rear of frons and vertex except the rear black. Occiput yellow, its margin ciliated with black.

Thorax yellow, with thin brownish hairs; a narrow middorsal fuscous stripe subobsolete anteriorly, forking above with the carina to unite on either side with the fused humeral and antehumeral stripes, which are separated by a narrow yellow line only in their middle portion. Sides yellow, with an incomplete fuscous stripe on the 1st and a complete narrow one on the 2nd lateral sutures, and with fuscous markings above the bases of the legs.

Wings hyaline (immature).

Legs fuscous; front femora paler below.

Abdomen black, marked with yellow as follows: Sides of segments 1 and 2, except behind auricles; two lateral spots on 2 to 7; sides of 8 and 9, except the inferior margin; apical half of 10; a maculose middorsal line reduced to very narrow basal spots on 5 to 8, wanting on 9.

Superior appendages slightly longer than 10, yellowish, darker at the tip, cylindric, moderately divaricate and equally narrowed in their apical fourth to an acute tip. Seen from the side they are a little angulated near the base and beyond this point irregularly denticulate beneath to a point just before the tip, where they are suddenly contracted from below upward, leaving the point at the upper side.

Inferior appendage bifid almost to its base, its branches straight, cylindric, about as long as superiors and twice as stout, almost as divergent, each apparently forked by reason of a very large external upturned tooth at two-fifths of its length; at the extreme apex another stout upturned tooth. (For genital hamules see plate.)

A single ♂, with its cast skin, from Wilmurt, N. Y., in the Cornell University collection.

*Ophiogomphus carolus*, n. sp. Male and female.—Ithaca, N. Y.

Length, 40-42 mm.; abdomen, 28-31; hind wing, 24-26.

Greenish-yellow and blackish-brown.

Face greenish-yellow, paler toward the mouth. Rear of frons and vertex except the rear, black. Occiput yellow, its slightly convex margin ciliated with long black hairs. In the female there is generally in front of the margin a pair of black-tipped spines, whose various development is shown in plate, figs. 1 to 4. These sometimes occupy the margin which then becomes notched between them. Rear of eyes black above, mottled with paler below.

Prothorax blackish, its hind lobe with a median twin spot and a lateral spot each side yellow.

Thorax greenish, its dorsal stripes fused, enveloping the carina and forking with it above to meet the humeral. Antehumeral stripe isolated above, sometimes meeting the humeral near its upper end, but well separated through most of its length by a narrow greenish line. A partial brown line on the 1st lateral suture and a narrow complete one on the 2nd.

Legs black, front femora paler below.

Wings hyaline, often flavescent at base, costa black; stigma cinereous.

Abdomen cylindric, a little narrower in its middle two-thirds, superiorly blackish with a maculose yellowish middorsal line of lanceolate spots on segments 3 to 7, of quadrangular basal spots on 8 and 9. Inferiorly, whitish with fuscous apical spots on most of the segments. Ten yellow; fuscous at both ends.

Male appendages: superiors, longer than the 10th segment, cylindric; seen from above, with acute apices divergent; seen from side, fusiform, with truncate apices, denticulate beneath for one-third their length. Inferior appendage (see plate, fig. 7) bifid by a rounded notch, each branch somewhat flattened with four distal angles (as shown in the figure) or sometimes with only two (merely obliquely truncate); always with an upturned tooth at the outermost angle, sometimes with another at the innermost.

The genital hamules are shown at fig. 6 in the plate. These appear to be quite constant in form.

Female appendages fuscous, longer than 10; anal segment as long as the 10th. Vulvar lamina about as long as the 9th segment; bifid except basal fourth, the branches enclosing an oval notch beyond which their incurved apices meet and then abruptly separate in short, oval, divergent points.

Described from more than seventy bred specimens (some of which will find their way into the collections of all my correspondents), from a single ♀ in the Cornell University collection, and from five specimens captured in May by Mr. Chester Young and Mr. J. O. Martin. I collected nymphs in October which emerged on my table in March. It was easy to collect the nymphs by hundreds in April, and in May the banks of the waters they frequented were fairly covered with exuviae. Yet, outside of my breeding cages I saw but one live imago, notwith-

standing I was doing much collecting at all times and in all places considered favourable. Where were they?

I have recently bred *A. villosipes*, Selys, by scores, and I find its exuviae sticking to every bank about Ithaca, yet I have not seen a single imago at large. The imagoes, where are they?

*Arigomphus australis*, n. sp. Male.—Gotha, Fla.

Length, 52 mm.; abdomen, 39; hind wing, 27.

Black and olive.

Face yellow with dense black pubescence.

A black stripe across base of labrum and another across the anterior margin of the frons. Rear of frons and whole of vertex black. Occiput yellow, convex, ciliate with black. Rear of eyes black above, yellow below.

Prothorax black with a median twin spot and a larger spot each side yellow.

Thorax olivaceous, striped with brown as follows: Dorsal stripes fused to form a cuneiform dorsal spot, not reaching the base, and narrowly divided with yellow along the extreme summit of the carina. Its narrow upper end is met by the strongly incurved antehumeral stripes, which are well separated from the narrower humeral stripes. Narrow but distinct stripes on both lateral sutures.

Legs black. Front femora pale within.

Wings hyaline, costa yellow, stigma brown. Veins black. Hind wing chalky near anal margin.

Abdomen long, slender. Segments 3 to 6 cylindric, narrower than terminal segments, entirely black. Remaining segments black, marked with yellow as follows: Sides of 1 and 2; dorsal lanceolate spots on 7 and 8; sides of 7 apically, and sides of 8 to 10 entirely yellow, 8 one-half longer than 9. Superior appendages about equalling 10, pale brown, divaricate at a right angle. Seen from above the inner margin is straight, the outer margin ends in a stout tooth, beyond which it is cut to a long acute point. Seen from the side each is gradually narrowed to a pointed apex, with a large acute tooth directly under the basal fourth, not visible at all from above. Inferior appendage with branches more divaricate, shorter, very little upcurved, ending under the apex of the lateral tooth.

One finely coloured ♂ taken by Mr. Adolph Hempel, in Orange Co., Fla., on the 21st of April, 1897.

At the same time Mr. Hempel took a *Progomphus obscurus*, Ramb., with its skin, in transformation. While the nymph was known by fair supposition, it appears not to have been reared before.

Mr. Hempel sent me also a nymph of the extraordinary type referred by Hagen (Trans. Amer. Ent. Soc., XII., 277, 1885) to *Aphylla producta*, Selys. It is time for someone to find the imago in Florida.

*Gomphus umbratus*, n. sp. Male and female.—Ithaca, N. Y.

Length, 50-54 mm.; abdomen, 35-39; hind wing, 30-32.

Brown and olive, variable.



Face yellow, washed with brown in indistinct lines across the base of the labium and close under the frontal prominence. Rear of frons above and whole of vertex brown. Antennæ black. Occiput yellow, its hind margin convex (male and female), ciliated with black.

Prothorax variable, but always showing a median twin spot of yellow.

Thorax *brown* with a pair of nearly parallel dorsal stripes of yellowish-green, each sending at its lower end a spur against the carina, and at its upper end another spur around the isolated upper end of the antehumeral stripe of brown. Humeral and antehumeral stripes of brown fused at lower end and near the upper end, and sometimes all the way between. Brown stripes of the lateral sutures overspreading the area between them, or sometimes the sides of the thorax wholly brown.

Femora brown, with numerous long spines in females. Tibiæ black, with a yellowish external line on each. Tarsi black.

Wings hyaline; their basal articulation and stigma rich brown when fully coloured. Costa yellow externally, veins black.

Abdomen cylindric in the female, slightly narrowed between the ends in the male, fuscous; basal fourth of middle segments paler and including a yellowish spot inferiorly. Middorsal stripe of yellow continuous at the base, reduced to lanceolate spots on segments 4 to 8, on 8 very short, on 9 wanting, 10 with a yellow spot in the female, uniform olive-brown in the male.

Male superior appendages flattened, a little arched. Seen from above the inner margin is nearly straight; at two-thirds their length they are cut obliquely to form a long point with an obtuse angle on the external margin. Seen from the side a low obtuse lobe appears on the interno-inferior carina just beyond the external angle. Inferior appendages a little shorter, more divergent and strongly upcurved at apices.

Female vulvar lamina transverse, one-third as long as wide, notched in the middle.

Described from seventeen specimens (14 males and three females), several of them bred, all obtained at Ithaca, N. Y., in May. A common species; next to *G. descriptus*, Banks, perhaps the commonest of the season; more variable in coloration than any other Gomphine I have seen.

*Stylurus segregans*, n. sp. . Male —Havana, Ill.

Length, 61 mm.; abdomen, 44; hind wing, 35.

Face yellowish. Frons yellow, infuscated superiorly. A narrow fuscous stripe in front of ocelli. Frons and the ridge-like elevations behind each lateral ocellus pilose with soft black hairs. Occiput yellow, its border straight, ciliated with stiff black hairs.

Thorax fuscous; dorsum with two isolated lateral yellow stripes, divergent anteriorly. A narrow antehumeral line and a broad stripe down the middle of each of the lateral sclerites, yellow.

Legs brownish, paler internally, with black spinules. Claws pale, with apex and inferior tooth black.

Wings hyaline.

Abdomen fuscous, marked with yellow as follows: Dorsum of segment 1, a line on 2, basal middorsal spots on 3 to 8, extreme apex of 8, sides of 1 and 2, basal lateral spot on 3 to 7, sides of 7 and 8 except extreme lateral margin and apex, and all of 10.

Male superior appendages yellowish-brown, much longer than 10, divaricate at almost a right angle, slightly incurved toward the tip and cut obliquely to form an obtuse external angle at two-thirds their length, and a supero-internal point. The bevelled portion is minutely denticulate opposite the apices of the inferior appendage. No teeth or spines. The inferior appendage is bifid half its length with branches strongly divergent and strongly upcurved, their apices resting outside the bevelled portion of the superiors. Posterior genital hamule simple; pointed, directed forward at an angle of 45 degrees with the axis of the abdomen.

Name refers to its extremely local occurrence.

The single imago was obtained by Mr. C. A. Hart and myself, by rearing a nymph which we found crawling from the water upon bur-rush leaves, 23rd June, 1896, in the mouth of Quiver Creek. I obtained several exuviae there, and several others later at McHairy's mill-dam some miles further up.

The nymphs of this and of the preceding species will be described in a forthcoming bulletin of the Illinois State Laboratory of Natural History.

Since this paper was written, I have obtained at Ithaca, N. Y., nymphs which can be none other than *Dromogomphus spinosus*, Selys. They fall in the same section of the table with *Arigomphus*, *Stylurus* and *Gomphus*, from all which they are distinguished by a sharp middorsal longitudinal ridge, ending in a straight apical spine on the 9th abdominal segment.

#### EXPLANATION OF PLATE 7.

Figs. 1, 2, 3 and 4.—The occiput of the female of *Ophiogomphus carolus*, seen from the front, showing variations in occipital spines.

Fig. 5.—Genital hamules of *Ophiogomphus johannus* from the left side, inverted.

Fig 6.—Do. of *Ophiogomphus carolus*.

Fig. 7.—Inferior abdominal appendage of *O. carolus* seen from below.

Fig. 8.—Head of nymph of *Lanthus parvulus*, seen from above and in front.

Fig. 9.—Mentum of labium of do. from above.

Fig. 10.—End of abdomen of do.

Fig. 11.—End of abdomen of *Gomphus fraternus*, nymph.

Fig. 12.—Part of labium of do.

Fig. 13.—End of abdomen of *Arigomphus pallidus*, nymph.

Fig. 14.—Part of labium of do.

Fig. 15.—End of abdomen of *Stylurus segregans*, nymph.

Fig. 16.—Part of labium of do.